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**November, 2016**

# STATE ROAD SITE ASPHALT REPAIR

## STATE ROAD SITE

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Date            **November 11, 2016**  
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## CONTENTS

<b>1.</b>	<b>OBJECTIVES</b>	<b>1</b>
<b>2.</b>	<b>TASKS COMPLETED</b>	<b>1</b>
2.1	Task 1: Demarcation of Repair Zone	2
2.2	Task 2: Removal of Weeds	2
2.3	Task 3: Milling of Keyway	3
2.4	Task 4: Petromat Installation	3
2.5	Task 5: Paving	4
<b>3.</b>	<b>CERTIFICATION</b>	<b>5</b>

## FIGURES

Figure 1 Yellow Outline Depicting Area of Asphalt Repairs  
Figure 2 Demarcation of Repair Area  
Figure 3 Herbicide Application on Repair Area  
Figure 4 Milling of Key Around Repair Area Perimeter  
Figure 5 Petromat Application on Repair Area  
Figure 6 Profile of October 2016 Asphalt Repairs  
Figure 7 Final Pavement and Seam Application

## APPENDICES

Appendix A Full Size Images  
Appendix B Herbicide Material Safety Data Sheets  
Appendix C Petromat Spec Sheet  
Appendix D Asphalt Spec Sheet

## 1. OBJECTIVES

The objective of this Final Report is to meet the requirements of §8.11 and §22.1-22.2 of the Administrative Settlement Agreement and Order on Consent for Removal Response Action ("the Order"), fully executed on July 20, 2016 between the United States Environmental Protection Agency Region III ("USEPA") and a group of electric utilities ("the Group") in the matter of the Metal Bank of America, Inc. (State Road) Site (the "site"). In this Final Report, we document that the Group successfully repaired the asphalt surface as specified in the Response Action Plan ("RAP") that the EPA approved on September 15, 2016. As stated in the RAP, the purpose of repairing the asphalt in the area outlined below was to prevent infiltration of rain and/or surface water into the subsurface of the area impacted by polychlorinated biphenyls (PCBs) in excess of 25 parts per million (ppm), in order to eliminate or reduce the potential for migration of PCBs.



Figure 1. Yellow Outline Depicting Area of Asphalt Repairs (Source: HGL, Google Earth)

## 2. TASKS COMPLETED

The work completed at the site was implemented in accordance with the RAP without any material deviations or changes. Following a topographical survey, drainage analysis, and contractor site inspection, paving **Option 4** of the RAP was implemented. More specifically, the asphalt cover was applied over the top of the existing pavement within the yellow outline shown in Figure 1. This section describes the various tasks completed during the field effort.

## 2.1 Task 1: Demarcation of Repair Zone

On behalf of the Group, Ramboll Environ and its subcontractor, Tony DePaul & Sons, met with EPA on site on Wednesday October 19 to demarcate the zone for asphalt repair. Delineation of the zone outlined in yellow in Figure 1 was based on soil boring locations from a previous soil sampling event (see Figure 1) that left small traceable markings on the ground. These markings served as the benchmark for the boundaries of repair and were marked with spray paint seen in the Figure 2 below. Full page-sized images of all the pictures included in the text section of this report are included in Appendix A.



Figure 2. Demarcation of Repair Area.

## 2.2 Task 2: Removal of Weeds

On Thursday October 20, as specified by the RAP, Weeds, Inc. of Aston, PA was on site to spray herbicide onto the repair area. The herbicide applied was a water based solution with a mixture of Razor (0.5%), Polaris® (0.33%), and Alligare Surface™ (0.25%) herbicides. Material safety datasheets are included as Appendix B. The herbicide mix was given approximately 24 hours to settle and DePaul & Sons later swept the property free of weeds with a sweep truck (October 22). The purpose of removing weeds was to establish a clean surface to apply the petromat and asphalt.



Figure 3. Herbicide Application on Repair Area.



### 2.3 Task 3: Milling of Keyway

On Friday October 21, DePaul & Sons were on site to mill pavement around the outside perimeter of the repair area outlined in yellow on Figure 1. The purpose of milling the perimeter was to establish a 7-ft wide “key”, or a groove in the existing pavement to establish firm contact between new and old asphalt and avoid an abrupt transition of elevations between the newly paved work area and the surrounding area. An illustration of the key profile is provided below in Figure 6. The depth of the key ranged from approximately 0” on the inside to 1-1.5” on the outside.



Figure 4. Milling of Key Around Repair Area Perimeter.

### 2.4 Task 4: Petromat Installation

On Monday October 24, Roth Brothers Construction Inc. of Yardville, New Jersey (“Roth Brothers”) were on site to apply Mirafi® MPV400 (“petromat”), a nonwoven geotextile specifically manufactured for the purpose of overlaying existing asphalt. The petromat was applied by spraying heated tack from a tack truck onto the repair area and immediately rolling the petromat onto the adhesive surface (Figure 5). The crew worked around the two manholes and storm drain located within the repair area. Specifications of the geosynthetic properties of the petromat applied at the site are referenced in Appendix C.



Figure 5. Petromat Application on Repair Area.

## 2.5 Task 5: Paving

On Wednesday October 26, DePaul & Sons were on site to pave the repair area and seal all seams. The two manholes were paved around at grade (a riser was added to match grade). A tack sealant was applied around the perimeter of the repair area and at both manholes and the storm drain.

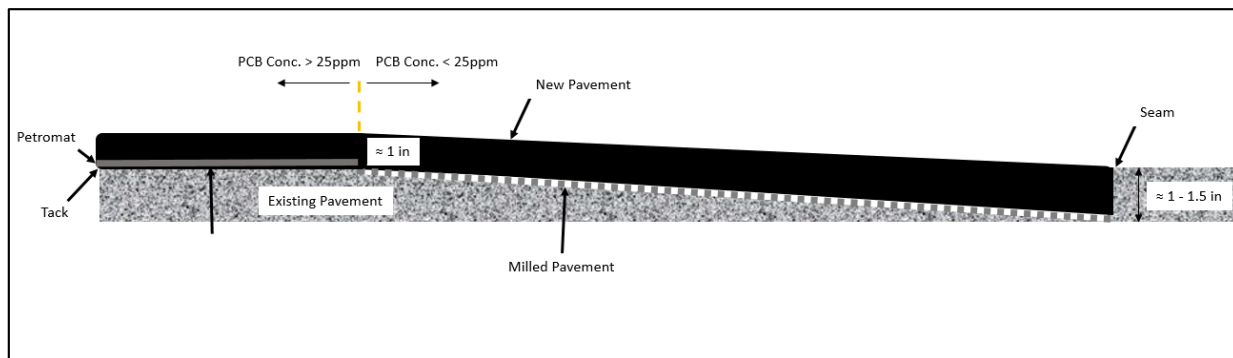


Figure 6. Profile of October 2016 Asphalt Repairs.

Asphalt specifications describing grade and characteristics are found in Attachment D. A total profile of the existing pavement, petromat, milled key, and asphalt are illustrated in Figure 6.

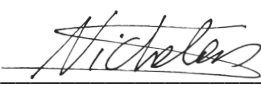


Figure 7. Final Pavement and Seam Application.

### 3. CERTIFICATION

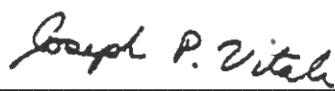
The following is a certification of compliance as required per §22.2 of the Order.

*I certify that the information contained in and accompanying this Final Report is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fines and imprisonment for knowing violations.*

Signature: \_\_\_\_\_  


Name (print): \_\_\_\_\_NICHOLAS STEENHAUT, PE\_\_\_\_\_

Title: \_\_\_\_\_SENIOR PROJECT MANAGER\_\_\_\_\_

Signature: \_\_\_\_\_  


Name (print): \_\_\_\_\_JOSEPH VITALE, PE\_\_\_\_\_

Title: \_\_\_\_\_PRINCIPAL CONSULTANT\_\_\_\_\_



**APPENDIX A**

**FULL SIZE IMAGES**



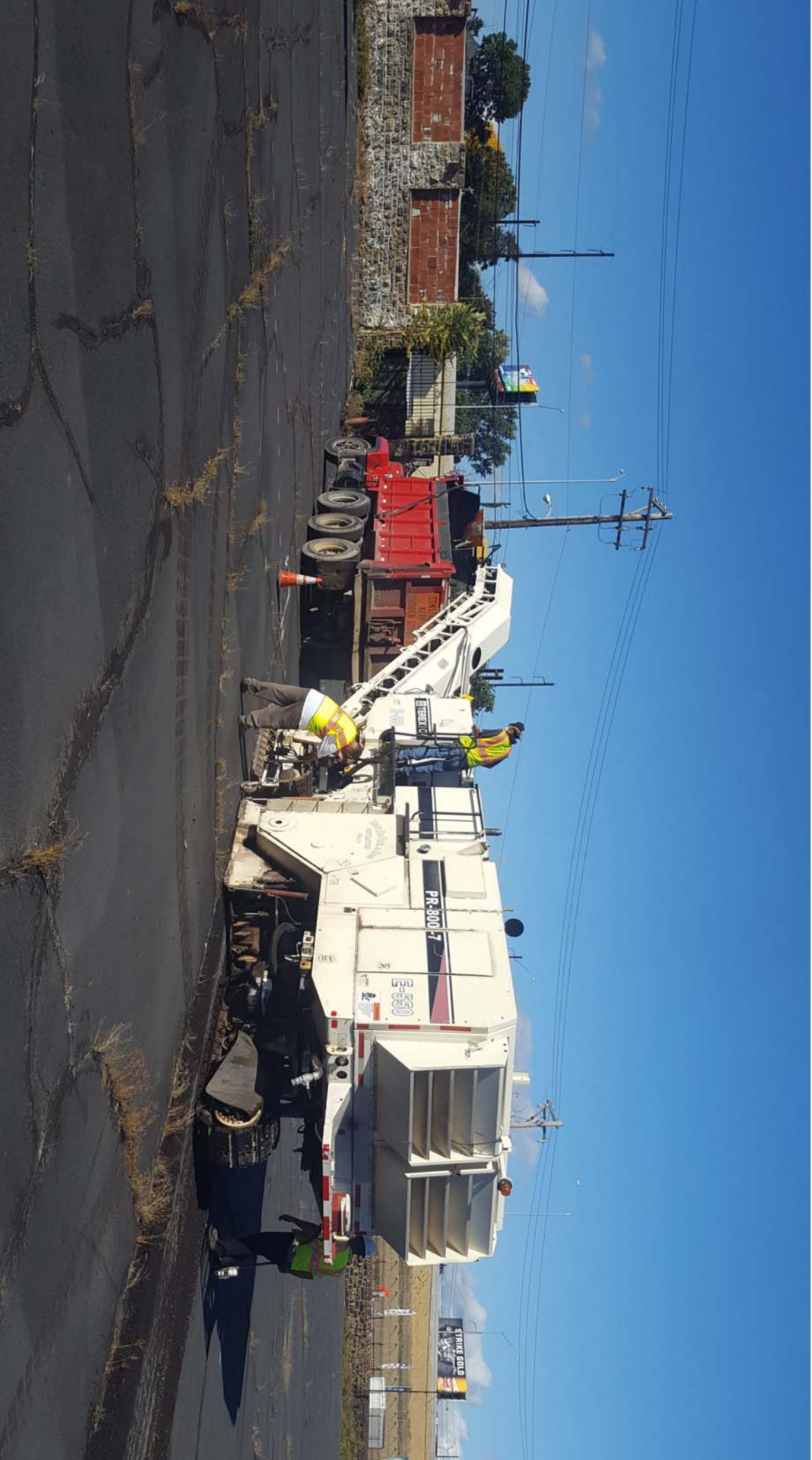






















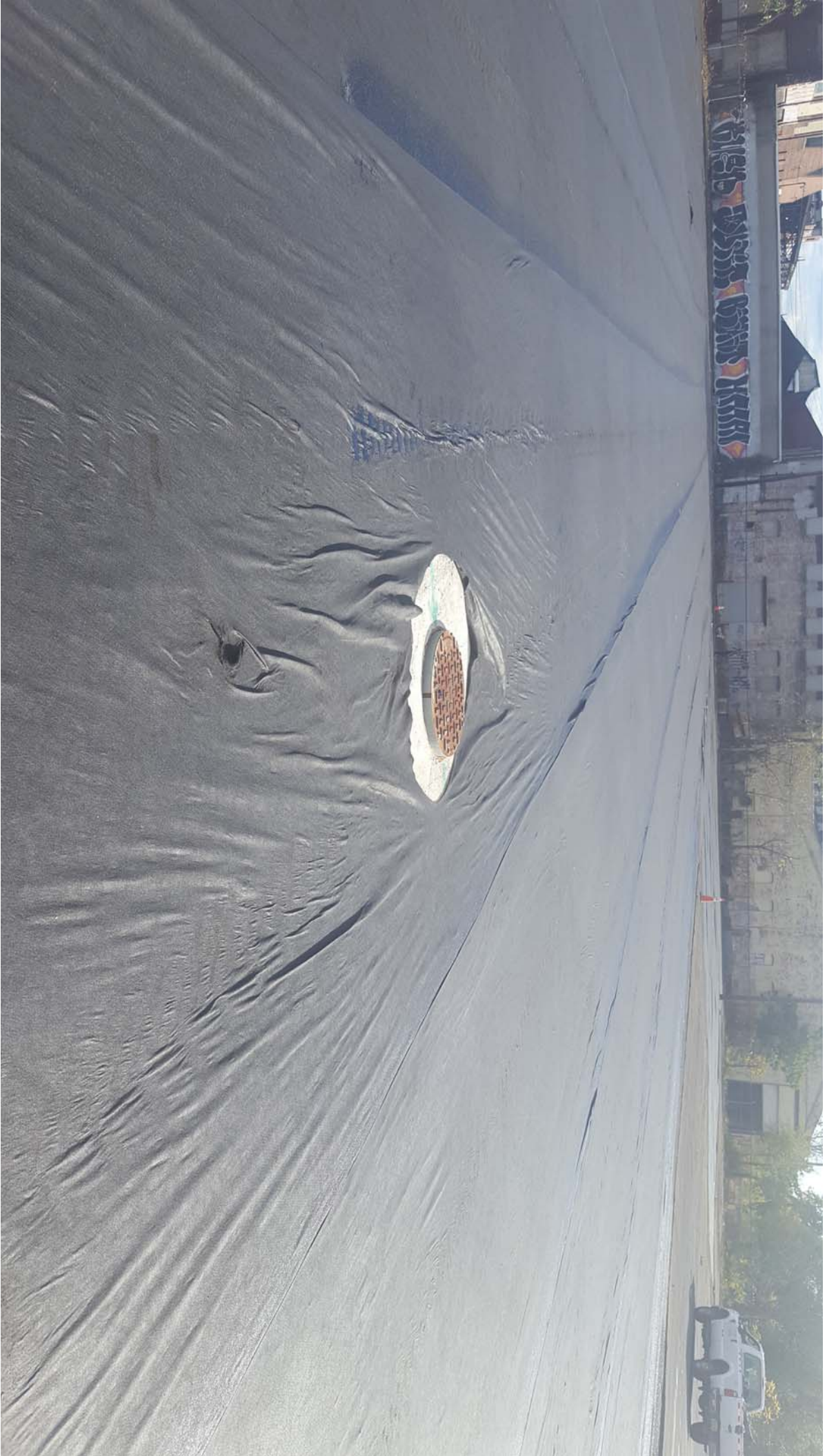


























## **APPENDIX B**

### **HERBICIDE MATERIAL SAFETY DATA SHEETS**



# SAFETY DATA SHEET

ALLIGARE, LLC



Updated: November 26, 2013

Page 1 of 3

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name:	<b>Alligare Surface™</b>
Manufactured for:	Alligare, LLC 13 N. 8th Street Opelika, AL 36801
Product Use:	Nonionic Surfactant
CAS Number:	Proprietary
Emergency telephone number:	(Chemtrec Information 24 hours) (800) 424-9300
For MSDS, Product Safety or Regulatory inquiries, call:	(800) 323-6280
Customer Service, call:	(847) 596-3001

## 2. HAZARDS IDENTIFICATION

Reportable Components: None



Primary Routes of Exposure: Eyes and Skin

Ingestion: May cause nausea, vomiting and diarrhea

Eye Contact: May cause slight irritation.

Skin Contact: May cause mild to moderate irritation.

Inhalation: Harmful if inhaled. May cause throat irritation and respiratory discomfort.

Other Effects: No information was found in connection with medical conditions aggravated by exposure. This product is not a carcinogen by NTP, OSHA and ACGIH.

## 3. COMPOSITION / INFORMATION ON INGREDIENTS

<u>Component</u>	<u>CAS Number</u>	<u>Weight %</u>
Mixture	Proprietary	100%

## 4. FIRST AID MEASURES

If in Eyes:	Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lens, if present, after the first 5 minutes, then continue rinsing eye. Seek medical attention.
If on Skin:	Remove contaminated clothing. Rinse skin immediately with plenty of water for 15–20 minutes. Seek medical attention.
If Swallowed:	Call a poison control center or doctor immediately for treatment advice. Have individual sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.
If Inhaled:	Move individual to fresh air. If not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Seek medical attention.

## 5. FIREFIGHTING MEASURES

Suitable Extinguishing media: Water spray, water fog, dry chemical, foam, CO<sub>2</sub> or sand/earth to extinguish flames.

Specific Hazards: Combustion may yield carbon dioxide and carbon monoxide.

PPE and Precautions: Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.

# SAFETY DATA SHEET

ALLIGARE, LLC



Updated: November 26, 2013

Page 2 of 3

## 6. ACCIDENTAL RELEASE MEASURES

In Case of Spill: Stop the flow of material, if this is without risk. Isolate area. Keep unnecessary personnel away. Absorb with an inert material such as sand, soil, or vermiculite and sweep up.

Disposal: Dispose of collected waste in accordance with federal, state and local regulations.

## 7. HANDLING AND STORAGE

Avoid eye and skin contact. Wash thoroughly after handling. Store between 0 and 120°F. Keep container tightly closed and upright when not in use to prevent leakage.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits: None

Eye/Face Protections: Wear protective eyewear. Contact lenses should not be worn when working with chemicals.

Skin Protection: Wear long-sleeved shirt; long pants; socks; shoes; and barrier laminate, neoprene rubber, nitrile rubber or Viton® gloves.

Respiratory Protection: None required where adequate ventilation conditions exist. If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection.

Note: When selecting personal protective equipment and clothing, follow all of the manufacturer specifications and recommendations that apply to your specific operation and processing conditions. Take into consideration all working conditions and all chemicals to be handled or processed.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear white liquid	UEL:	N/D
Odor:	Fatty odor	LEL:	N/D
Odor Threshold:	N/D	Vapor Pressure:	N/D
pH:	6.5-7.5	Vapor Density:	N/D
Melting Point:	N/D	Relative Density:	8.67 lbs/gallon
Freezing Point:	N/D	Solubility:	Dispersible in water
Boiling Point:	N/D	Partition Coefficient:	N/D
Flash Point:	212°F	Autoignition Temperature:	N/D
Evaporation Rate:	N/D	Decomposition Temperature:	N/D
Flammability:	N/D		

## 10. STABILITY AND REACTIVITY

Stability: Stable

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Condition to Avoid: Isolate from oxidizers, heat and open flame.

Incompatible Materials: Strong oxidizers

Hazardous Decomposition Products: Carbon Oxides, Sulfur Oxides, Sodium Oxide and Hydroxide from burning.

## 11. TOXICOLOGICAL INFORMATION

No toxicological data is available for this product.

## 12. ECOLOGICAL INFORMATION

No ecological data is available for this product.



# SAFETY DATA SHEET

ALLIGARE, LLC



Updated: November 26, 2013

Page 3 of 3

## 13. DISPOSAL CONSIDERATIONS

Component Waste Numbers:	No EPA Waste Numbers are applicable for this product's components.
Disposal Instructions:	All wastes must be handled in accordance with local, state and federal regulations. See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.
Container Reuse:	An empty container can contain product residue, and should not be reused. If not professionally cleaned and reconditioned, crushing or other means is recommended to prevent unauthorized reuse.

## 14. TRANSPORT INFORMATION

DOT Status (Highway and rail):	Not Regulated
IATA Status (Air):	Not Regulated
Marine Pollutant:	No

## 15. REGULATORY INFORMATION

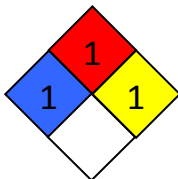
TSCA: All components of this product are listed under the regulation of the Toxic Substance Control Act.

SARA HAZARD: No

## 16. OTHER INFORMATION

HMIS Hazard Rating

Health:	1
Flammability:	1
Reactivity:	1
Personal Protection:	X



Date Prepared: November 26, 2013

Last Updated: November 26, 2013

**WHILE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREON, ALLIGARE, LLC MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.**

N/R—Not Rated

N/D—Not Determined

N/A—Not Applicable

N/E—Not Established

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration., NJTSR = New Jersey Trade Secret Registry.

**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**Product Name:** Razor Herbicide  
**EPA Reg. No.:** 228-366  
**Product Type:** Herbicide  
**Company Name:** Nufarm Americas Inc.  
11901 S. Austin Avenue  
Alsip, IL 60803  
1-800-345-3330

**Telephone Numbers:** For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident,  
Call CHEMTREC Day or Night: 1-800-424-9300  
For Medical Emergencies Only, Call 1-877-325-1840

This product is an EPA FIFRA registered pesticide. Some classifications on this SDS are not the same as on the FIFRA label. Certain sections are superseded by federal law governed by EPA for a registered pesticide. Please see Section 15. Regulatory Information for explanation.

**2. HAZARDS IDENTIFICATION****PHYSICAL HAZARDS:**

Not Hazardous

**HEALTH HAZARDS:**

Eye irritation Category 2B

**ENVIRONMENTAL HAZARDS**

Hazardous to aquatic environment, acute Category 2  
Hazardous to aquatic environment, chronic Category 2

**SIGNAL WORD**

(No signal word)

**HAZARD STATEMENTS:**

Causes eye irritation. Toxic to aquatic life with long lasting effects.

**PRECAUTIONARY STATEMENTS**

Wash hands thoroughly after handling. Avoid unintended release to the environment.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Collect spillage.

Dispose of contents in accordance with local, state, and federal regulations.

**3. COMPOSITION / INFORMATION ON INGREDIENTS**

COMPONENTS	CAS NO.	% BY WEIGHT
N-(phosphonomethyl)glycine, Isopropylamine salt	38641-94-0	39.7 – 42.2
Other Ingredients	Trade Secret	Trade Secret

**Synonyms:** Glyphosate IPA; N-(phosphonomethyl) glycine, in the form of its isopropylamine salt.

Ingredients not precisely identified are proprietary or non-hazardous. Values are not product specifications.



**4. FIRST AID MEASURES**

**If in Eyes:** Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Get medical attention if irritation develops and persists.

**If Swallowed:** Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person. If symptoms develop, get medical advice.

**If Inhaled:** Move person to fresh air. If symptoms develop, get medical advice.

**If on Skin or Clothing:** Take off contaminated clothing. Wash with soap and water. Get medical attention if irritation develops and persists.

**Most Important symptoms/effects, acute and delayed:** May cause moderate eye irritation.

**Indication of Immediate medical attention and special treatment if needed:** None expected. For ingestion there is no specific antidote available. Treat symptomatically.

**5. FIRE FIGHTING MEASURES**

**Extinguishing Media:** Recommended for large fires: foam or water spray. Recommended for small fires: dry chemical or carbon dioxide.

**Special Fire Fighting Procedures:** Firefighters should wear NIOSH approved self-contained breathing apparatus and full fire-fighting turn out gear. Dike area to prevent runoff and contamination of water sources. Dispose of fire control water later.

**Unusual Fire and Explosion Hazards:** If water is used to fight fire, contain runoff, using dikes to prevent contamination of water supplies. Dispose of fire control water later. This product reacts with galvanized steel or unlined steel (except stainless steel) to produce hydrogen gas that may form a highly combustible gas mixture which could flash or explode.

**Hazardous Decomposition Materials (Under Fire Conditions):** May produce gases such as oxides of carbon, nitrogen, and phosphorous.

**6. ACCIDENTAL RELEASE MEASURES**

**Personal Precautions:** Wear appropriate protective gear for the situation. See Personal Protection information in Section 8.

**Environmental Precautions:** Prevent material from entering public sewer systems or any waterways. Do not flush to drain. Large spills to soil or similar surfaces may necessitate removal of topsoil. The affected area should be removed and placed in an appropriate container for disposal.

**Methods for Containment:** Dike spill using absorbent or impervious materials such as earth, sand or clay. Collect and contain contaminated absorbent and dike material for disposal.

**Methods for Cleanup and Disposal:** Pump any free liquid into an appropriate closed container. Collect washings for disposal. Decontaminate tools and equipment following cleanup. See Section 13: DISPOSAL CONSIDERATIONS for more information.

**Other Information:** Large spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies.

**7. HANDLING AND STORAGE****Handling:**

Avoid contact with eyes, skin or clothing. Avoid breathing spray mist. Users should wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Spray solutions of this product should be mixed, stored and applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

# SAFETY DATA SHEET

# Razor Herbicide

## Storage:

STORE ABOVE 10° F (-12° C) TO KEEP PRODUCT FROM CRYSTALLIZING. Crystals will settle to the bottom. If allowed to crystallize, place in a warm room 68° F (20° C) for several days to redissolve and shake, roll or agitate to mix well before using. Do not contaminate water, foodstuff, feed or seed by storage or disposal.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### Engineering Controls:

Where engineering controls are indicated by specific use conditions or a potential for excessive exposure, use local exhaust ventilation at the point of generation.

### Personal Protective Equipment:

**Eye/Face Protection:** To avoid contact with eyes, wear chemical goggles. An emergency eyewash or water supply should be readily accessible to the work area.

**Skin Protection:** To avoid contact with skin, wear long pants, long-sleeved shirt, socks and shoes. Washing facilities should be readily accessible to the work area.

**Respiratory Protection:** Not normally required. If vapors or mists exceed acceptable levels, wear NIOSH approved air-purifying respirator with cartridges/canisters approved for use against pesticides.

**General Hygiene Considerations:** Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this material: 1) do not store, use and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored; 2) wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics or using the toilet.

### Exposure Guidelines:

Component	OSHA		ACGIH		Unit
	TWA	STEL	TWA	STEL	
Glyphosate IPA	NE	NE	NE	NE	
Other Ingredients	NE	NE	NE	NE	

NE = Not Established

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance:</b>	Transparent greenish/yellow liquid
<b>Odor:</b>	Odorless
<b>Odor threshold:</b>	No data available
<b>pH:</b>	4.84 (1% w/w solution in DIW)
<b>Melting point/freezing point:</b>	No data available
<b>Initial boiling point and boiling range</b>	No data available
<b>Flash point:</b>	Not applicable due to aqueous salt based composition
<b>Evaporation rate:</b>	No data available
<b>Flammability (solid, gas):</b>	No data available
<b>Upper/lower flammability or explosive limits:</b>	No data available
<b>Vapor pressure:</b>	No data available
<b>Vapor density:</b>	No data available
<b>Relative density:</b>	1.16 g/mL @ 20° C
<b>Solubility(ies):</b>	No data available
<b>Partition coefficient: n-octanol/water:</b>	No data available
<b>Autoignition temperature:</b>	No data available
<b>Decomposition temperature:</b>	No data available
<b>Viscosity:</b>	29.5 cPs @ 20° C; 14.3 cPs @ 40° C
<b>VOC Emission Potential (%):</b>	0.00

**Note:** Physical data are typical values, but may vary from sample to sample. A typical value should not be construed as a guaranteed analysis or as a product quality specification.

## 10. STABILITY AND REACTIVITY

**Reactivity:** Not reactive.

**Chemical Stability:** This material is stable under normal handling and storage conditions.

**Possibility of Hazardous Reactions:** Will not occur.

**Conditions to Avoid:** Excessive heat. Do not store near heat or flame.



## SAFETY DATA SHEET

## Razor Herbicide

**Incompatible Materials:** Strong oxidizing agents: bases and acids. This product reacts with galvanized steel or unlined steel (except stainless steel) to produce hydrogen gas that may form a highly combustible gas mixture which could flash or explode.

**Hazardous Decomposition Products:** Under fire conditions, may produce gases such as oxides of carbon, nitrogen and phosphorous.

### 11. TOXICOLOGICAL INFORMATION

**Likely Routes of Exposure:** Eye contact, Skin contact

**Symptoms of Exposure:**

**Eye Contact:** The undiluted product may cause pain, redness and tearing based on toxicity studies.

**Skin Contact:** Slightly toxic and slightly irritating based on toxicity studies.

**Ingestion:** Slightly toxic based on toxicity studies. No significant adverse health effects are expected to develop if only small amounts (less than a mouthful) are swallowed.

**Inhalation:** Low inhalation toxicity.

**Delayed, immediate and chronic effects of exposure:** None reported.

**Toxicological Data:**

Data from laboratory studies on this product are summarized below:

**Oral:** Rat LD<sub>50</sub>: >5,000 mg/kg

**Dermal:** Rat LD<sub>50</sub>: >5,000 mg/kg

**Inhalation:** Rat 4-hr LC<sub>50</sub>: >2.05mg/l (no mortality at highest dose tested)

**Eye Irritation:** Rabbit: Moderately irritating (MMTS=18.0)

**Skin Irritation:** Rabbit: Non-irritating (PDII= 1.7)

**Skin Sensitization:** Not a contact sensitizer in guinea pigs following repeated skin exposure.

**Subchronic (Target Organ) Effects:** Repeated overexposure to glyphosate may decrease body weight gains and effects to liver.

**Carcinogenicity / Chronic Health Effects:** Prolonged overexposure to glyphosate may cause effects to the liver. EPA has given glyphosate a Group E classification (evidence of non-carcinogenicity in humans). Canada PMRA has classified glyphosate as non-carcinogenic. In 2015 IARC classified glyphosate as a probable human carcinogen Group 2A based on limited human evidence and some evidence in animals.

**Reproductive Toxicity:** In laboratory animal studies with glyphosate, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

**Developmental Toxicity:** In animal studies, glyphosate did not cause birth defects in animals; other effects were seen in the fetus only at doses which caused toxic effects to the mother.

**Genotoxicity:** Glyphosate has produced no genetic changes in a variety of standard tests using animals and animal or bacterial cells.

#### ASSESSMENT CARCINOGENICITY:

Component	Regulatory Agency Listing As Carcinogen			
	ACGIH	IARC	NTP	OSHA
Glyphosate	No	2A	No	No
Other Ingredients	No	No	No	No

### 12. ECOLOGICAL INFORMATION

#### Ecotoxicity:

Data on Glyphosate IPA

96-hour LC<sub>50</sub> Rainbow Trout: >1000 mg/l

48-hour EC<sub>50</sub> Daphnia: 930 mg/l

72-hour ErC<sub>50</sub> Algae: 166 mg/l

Data on Glyphosate Acid:

96-hour LC<sub>50</sub> Bluegill: 120 mg/l

96-hour LC<sub>50</sub> Rainbow Trout: 786 mg/l

48-hour EC<sub>50</sub> Daphnia: 780 mg/l

96-hour EC<sub>50</sub> Diatoms: 1.3 mg/l

14-day EC<sub>50</sub> Duckweed: 25.5 mg/l

72-hour EC<sub>50</sub> Algae: 450 mg/l

Bobwhite Quail Acute Oral LD<sub>50</sub>: >3,851 mg/kg

Bobwhite Quail 5-day Dietary LC<sub>50</sub>: >4,640 ppm

Mallard Duck 5-day Dietary LC<sub>50</sub>: >4,640 ppm

**Environmental Fate:**

In the environment glyphosate adsorbs strongly to soil and is expected to be immobile in soil. Glyphosate is readily degraded by soil microbes to AMPA (aminomethyl phosphonic acid) that is further degraded to carbon dioxide. Glyphosate and AMPA are unlikely to enter ground water due to their strong adsorptive characteristics. Terrestrially-applied glyphosate has the potential to move into surface waters through soil erosion because it may be adsorbed to soil particles suspended in the runoff. Aquatic applications registered for certain formulations may also result in glyphosate entering surface waters. Complete degradation is slow, but dissipation in water is rapid because glyphosate is bound in sediments and has low biological availability to aquatic organisms. These characteristics suggest a low potential for bioconcentration in aquatic organisms and this has been verified by laboratory investigations of glyphosate bioconcentration in numerous marine and freshwater organisms with and without soil. The maximum whole body bioconcentration factors for fish were observed to be less than 1X. Bioconcentration factors for sediment dwelling mollusks and crayfish tended to be slightly higher, but were always less than 10X. In addition, any residues accumulated in organisms were rapidly eliminated.

**13. DISPOSAL CONSIDERATIONS****Waste Disposal Method:**

Wastes resulting from use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or in accordance with applicable Federal, state or local procedures. Emptied container retains vapors and product residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

**Container Handling and Disposal:**

**Nonrefillable Containers 5 Gallons or Less:** Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available. Triple rinse container (or equivalent) promptly after emptying.

**Triple rinse as follows:** Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by State and local authorities. Plastic containers are also disposable by incineration, or, if allowed by State and local authorities, by burning. If burned stay out of smoke.

**Nonrefillable containers larger than 5 gallons:** Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available. If recycling or reconditioning not available, puncture and dispose of in a sanitary landfill, or by other procedures approved by State and local authorities. Plastic containers are also disposable by incineration, or, if allowed by State and local authorities, by burning. If burned stay out of smoke. Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

**Triple rinse as follows:** Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times.

**Pressure rinse as follows:** Empty the remaining contents into application equipment or a mix tank and collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

**Refillable containers larger than 5 gallons:** Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or a mix tank. Fill the container about 10% full with water. Agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

**14. TRANSPORTATION INFORMATION**

Follow the precautions indicated in Section 7: HANDLING AND STORAGE of this MSDS.

**DOT:**

Non Regulated



**IMDG:**

Non Regulated

**IATA:**

Non Regulated

**15. REGULATORY INFORMATION****EPA FIFRA INFORMATION**

This chemical is a pesticide product registered by the United States Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets (SDS), and for workplace labels of non-pesticide chemicals. The hazard information required on the pesticide label is reproduced below. The pesticide label also includes other important information, including directions for use.

Caution. Causes moderate eye irritation. Harmful if swallowed or inhaled. Avoid contact with eyes, skin or clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling.

**U.S. FEDERAL REGULATIONS**

**TSCA Inventory:** This product is exempted from TSCA because it is solely for FIFRA regulated use.

**SARA Hazard Notification/Reporting:****Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370):**

Acute Health, Chronic Health

**Section 313 Toxic Chemical(s):**

None

**Reportable Quantity (RQ) under U.S. CERCLA:**

None

**RCRA Waste Code:**

Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

**State Information:**

Other state regulations may apply. Check individual state requirements.

**California Proposition 65:** Not Listed.

**16. OTHER INFORMATION****National Fire Protection Association (NFPA) Hazard Rating:**

**Rating for this product: Health: 1 Flammability: 1 Reactivity: 0**

Hazards Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

This Safety Data Sheet (SDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-ACCEPTED PRODUCT LABELING (attached to and accompanying the product container). This SDS provides important health, safety and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

Use, storage and disposal of pesticide products are regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling, and all necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of Federal law to use a pesticide product in any manner not prescribed on the EPA-accepted label.

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, Nufarm Americas Inc. makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Nufarm Americas Inc. be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH

## **SAFETY DATA SHEET**

**Razor Herbicide**

RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS AND ALL SUCH WARRANTIES ARE HEREBY SPECIFICALLY DISCLAIMED.

**Date of Issue:** May 15, 2015

**Supersedes:** April 8, 2015



**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION****Product Name:** Polaris® Herbicide**EPA Reg. No.:** 228-534**Product Type:** Herbicide**Company Name:** Nufarm Americas Inc.  
11901 S. Austin Avenue  
Alsip, IL 60803  
1-800-345-3330**Telephone Numbers:** For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident,  
Call CHEMTREC Day or Night: 1-800-424-9300  
For Medical Emergencies Only, Call 1-877-325-1840

This product is an EPA FIFRA registered pesticide. Some classifications on this SDS are not exactly the same as on the FIFRA label. Certain sections are superseded by federal law governed by EPA for a registered pesticide. Please see Section 15. REGULATORY INFORMATION for explanation.

**2. HAZARDS IDENTIFICATION****PHYSICAL HAZARDS:**

Not hazardous

**HEALTH HAZARDS:**

Not hazardous

**ENVIRONMENTAL HAZARDS:**

Not hazardous

**SIGNAL WORD:**

None Required

**HAZARD STATEMENTS:**

Not hazardous in accordance with 29CFR 1910.1200 (Hazcom 2012)

**PRECAUTIONARY STATEMENTS**

Use with appropriate protective equipment.

**3. COMPOSITION / INFORMATION ON INGREDIENTS****COMPONENTS**

Isopropylamine Salt of Imazapyr

Other Ingredients

**CAS NO.**

81510-83-0

Trade Secret

**% BY WEIGHT**

22 – 23.3

Trade Secret

**Synonyms:** 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid

Ingredients not precisely identified are proprietary or non-hazardous. Values are not product specifications.

**4. FIRST AID MEASURES****If Inhaled:** Move person to fresh air. Seek medical attention if symptoms develop.**If in Eyes:** Hold eye open and rinse slowly and gently with water for sever minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Seek medical attention if irritation persists.**If on Skin or Clothing:** Take off contaminated clothing. Rinse skin immediately with plenty of water Seek medical attention if irritation persists.**If Swallowed:** Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person. Seek medical attention if symptoms develop**Most Important symptoms/effects, acute and delayed:** None expected.

**Indication of Immediate medical attention and special treatment if needed:** Immediate medical attention is not generally required. For ingestion there is no specific antidote available. Treat symptomatically.

## 5. FIRE FIGHTING MEASURES

**Extinguishing Media:** Use media that is suitable for the surrounding fire.

**Special Fire Fighting Procedures:** Firefighters should wear NIOSH approved self-contained breathing apparatus and full fire-fighting turn out gear. Dike area to prevent runoff and contamination of water sources. Dispose of fire control water later.

**Unusual Fire and Explosion Hazards:** This product is not flammable or combustible. If water is used to fight fire, contain runoff, using dikes to prevent contamination of water supplies. Dispose of fire control water later.

**Hazardous Decomposition Materials (Under Fire Conditions):** May produce gases such as oxides of carbon, hydrogen and nitrogen.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautions:** Wear appropriate protective gear for the situation. See Personal Protection information in Section 8.

**Environmental Precautions:** Prevent material from entering public sewer systems or any waterways. Do not flush to drain. Large spills to soil or similar surfaces may necessitate removal of topsoil. The affected area should be removed and placed in an appropriate container for disposal.

**Methods for Containment:** Dike spill using absorbent or impervious materials such as earth, sand or clay. Collect and contain contaminated absorbent and dike material for disposal.

**Methods for Cleanup and Disposal:** Pump any free liquid into an appropriate closed container. Absorb residues with an inert material and place in a suitable container for disposal. Decontaminate tools and equipment following cleanup. See Section 13: DISPOSAL CONSIDERATIONS for more information.

**Other Information:** Large spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies.

## 7. HANDLING AND STORAGE

### HANDLING:

Avoid contact with skin, eyes, or clothing. Avoid breathing spray mist. Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Spray solutions of this product should be mixed, stored, and applied only in stainless steel, fiberglass, plastic, and plastic-lined steel containers. DO NOT mix, store, or apply this product or spray solutions of this product in unlined steel (except stainless steel) containers or spray tanks.

### STORAGE:

Do not store below 10° F. Do not contaminate water, food, or feed by storage or disposal.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### Engineering Controls:

Where engineering controls are indicated by specific use conditions or a potential for excessive exposure, use local exhaust ventilation at the point of generation.

### Personal Protective Equipment:

**Eye/Face Protection:** To avoid contact with eyes, wear chemical goggles or shielded safety glasses. **Skin Protection:** To avoid contact with skin wear long-sleeved shirt and long pants, shoes plus socks, chemical-resistant gloves made of any waterproof material. Washing facilities should be readily accessible to the work area.

**Respiratory Protection:** Not normally required. If vapors or mists exceed acceptable levels, wear NIOSH approved air-purifying respirator with cartridges/canisters approved for use against pesticides.

**General Hygiene Considerations:** Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this material: 1) do not store, use and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored; 2) wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics or using the toilet.



## Exposure Guidelines:

Component	OSHA		ACGIH		Unit
	TWA	STEL	TWA	STEL	
Imazapyr	NE	NE	NE	NE	
Other Ingredients	NE	NE	NE	NE	

NE = Not Established

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance:</b>	Blue liquid
<b>Odor:</b>	Faint ammonia like
<b>Odor threshold:</b>	No data available
<b>pH:</b>	6.26 (1% w/w dilution in DIW)
<b>Melting point:</b>	No data available
<b>Initial boiling point and boiling range</b>	No data available
<b>Flash point:</b>	>212° F (>100° C)
<b>Evaporation rate:</b>	No data available
<b>Flammability (solid, gas):</b>	No data available
<b>Upper/lower flammability or explosive limits:</b>	No data available
<b>Vapor pressure:</b>	No data available
<b>Vapor density:</b>	No data available
<b>Relative density:</b>	1.057 g/mL @ 20° C
<b>Solubility(ies):</b>	No data available
<b>Partition coefficient: n-octanol/water:</b>	No data available
<b>Autoignition temperature:</b>	No data available
<b>Decomposition temperature:</b>	No data available
<b>Viscosity:</b>	3.766 cSt @20° C; 1.988 cSt @ 40° C
<b>VOC Emission Potential (%):</b>	-0.13 (TGA)

**Note:** Physical data are typical values, but may vary from sample to sample. A typical value should not be construed as a guaranteed analysis or as a specification.

## 10. STABILITY AND REACTIVITY

**Reactivity:** Not reactive.

**Chemical Stability:** This material is stable under normal handling and storage conditions.

**Possibility of Hazardous Reactions:** Will not occur

**Conditions to Avoid:** Excessive heat. Do not store near heat or flame. Do not mix or store this product or solutions of this product in unlined steel containers

**Incompatible Materials:** Strong oxidizing agents: bases and acids.

**Hazardous Decomposition Products:** Under fire conditions may produce gases such as oxides of carbon, hydrogen and nitrogen.

## 11. TOXICOLOGICAL INFORMATION

**Likely Routes of Exposure:** Eye contact, Skin contact

**Eye Contact:** Minimally irritating. May cause irritation, redness and tearing.

**Skin Contact:** Slightly toxic and no more than mildly irritating based on toxicity studies.

**Ingestion:** Low toxicity based on toxicity studies.

**Inhalation:** Low toxicity based on toxicity studies.

**Delayed, immediate and chronic effects of exposure:** None expected.

**Toxicological Data:**

Data from laboratory studies conducted on Imazapyr Technical:

**Oral:** Rat LD<sub>50</sub>: >5,000 mg/kg

**Dermal:** Rabbit LD<sub>50</sub>: >5,000 mg/kg

**Inhalation:** Rat 4-hr LC<sub>50</sub>: >2.07 mg/l (no mortalities highest dose attainable)

**Eye Irritation:** Rabbit: Minimally irritating (MMTS= 6.0)

**Skin Irritation:** Rabbit: Slightly irritating (PDII=0.8)

**Skin Sensitization:** Not a contact sensitizer in guinea pigs following repeated skin exposure.

**Subchronic (Target Organ) Effects:** For imazapyr, no adverse effects at approximately 1,700 mg/kg/day (highest dose tested).

**Carcinogenicity / Chronic Health Effects:** Imazapyr did not cause cancer in laboratory animals. EPA has classified imazapyr as a Group E (evidence of non-carcinogenicity for humans) carcinogen.

**Reproductive Toxicity:** The results of animal studies with imazapyr gave no indication of a fertility impairing effect.

**Developmental Toxicity:** No indications of a developmental toxic / teratogenic effect were seen in animal studies with imazapyr.

**Genotoxicity:** For imazapyr, no mutagenic effect was found in various tests with microorganisms and mammals.

**Assessment Carcinogenicity:** None listed with ACGIH, IARC, NTP or OSHA.

## 12. ECOLOGICAL INFORMATION

### Ecotoxicity:

Data on Imazapyr:

96-hour LC <sub>50</sub> Bluegill:	>100 mg/l	Bobwhite Quail 8-day Dietary LC <sub>50</sub> :	>5,000 ppm
96-hour LC <sub>50</sub> Rainbow Trout:	>100 mg/l	Bobwhite Quail Oral LD <sub>50</sub> :	>2,150 mg/kg
48-hour EC <sub>50</sub> Daphnia:	>100 mg/l	Mallard Duck 8-day Dietary LC <sub>50</sub> :	>5,000 ppm
14-day EC <sub>50</sub> Duckweed:	0.024 mg/l	Mallard Duck Oral LD <sub>50</sub> :	>2,150 mg/kg
7-day EC <sub>50</sub> Green Algae:	71 mg/l	Honey Bee LD <sub>50</sub> :	>100 mg/bee

### Environmental Fate:

Imazapyr is degraded by microbial metabolism and can be relatively persistent in soils. It has an average half-life in soils that ranges from 2 weeks to 5 months. Half-lives tend to be shorter in forest litter and soils. Imazapyr is water-soluble and variably binds to organic materials in the soils. Although the potential to leach is high, leaching is limited under typical field conditions. In water, imazapyr can be rapidly degraded by photolysis with a half-life averaging 2 days. Due to its rapid photodegradation by sunlight, water contamination by imazapyr is generally not of concern.

## 13. DISPOSAL CONSIDERATIONS

### Waste Disposal Method:

Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

### Container Handling and Disposal:

**Nonrefillable Containers 5 Gallons or Less:** Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying.

**Triple rinse as follows:** Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by State and local authorities. Plastic containers are also disposable by incineration, or, if allowed by State and local authorities, by burning. If burned stay out of smoke.

**Nonrefillable containers larger than 5 gallons:** Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available. Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

**Triple rinse as follows:** Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times.

**Pressure rinse as follows:** Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of



## SAFETY DATA SHEET

Polaris® Herbicide

the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

**Refillable containers larger than 5 gallons:** Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or a mix tank. Fill the container about 10% full with water and, if possible, spray all sides while adding water. Agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

### 14. TRANSPORTATION INFORMATION

Follow the precautions indicated in Section 7: HANDLING AND STORAGE of this SDS.

**DOT**

Not Regulated

**IMDG**

Not Regulated

**IATA**

Not Regulated

### 15. REGULATORY INFORMATION

#### EPA FIFRA INFORMATION

This chemical is a pesticide product registered by the United States Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets (SDS), and for workplace labels of non-pesticide chemicals. The hazard information required on the pesticide label is reproduced below. The pesticide label also includes other important information, including directions for use.

CAUTION. No human or domestic animal hazard statements are required. Follow instructions for Personal Protective Equipment and User Safety Recommendations.

#### U.S. FEDERAL REGULATIONS

**TSCA Inventory:** This product is exempted from TSCA because it is solely for FIFRA regulated use.

**SARA Hazard Notification/Reporting:**

**Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370):**

Not hazardous

**Section 313 Toxic Chemical(s):**

None

**Reportable Quantity (RQ) under U.S. CERCLA:**

None

**RCRA Waste Code:**

Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

**State Information:**

Other state regulations may apply. Check individual state requirements.

**California Proposition 65:** Not Listed.

**16. OTHER INFORMATION****National Fire Protection Association (NFPA) Hazard Rating:****Rating for this product: Health: 1    Flammability: 0    Reactivity: 0****Hazards Scale: 0 = Minimal    1 = Slight    2 = Moderate    3 = Serious    4 = Severe**

This Safety Data Sheet (SDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-ACCEPTED PRODUCT LABELING (attached to and accompanying the product container). This SDS provides important health, safety and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

Use, storage and disposal of pesticide products are regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling, and all necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of Federal law to use a pesticide product in any manner not prescribed on the EPA-accepted label.

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, Nufarm Americas Inc. makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Nufarm Americas Inc. be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS AND ALL SUCH WARRANTIES ARE HEREBY SPECIFICALLY DISCLAIMED.

**Date of Issue:**                      April 12, 2015**Supersedes:**                      October 16, 2013

Polaris is a registered trademark of Nufarm Americas Inc.



**APPENDIX C**

**PETROMAT SPEC SHEET**



## Mirafi<sup>®</sup> MPV400

Mirafi<sup>®</sup> MPV400 is a heat-set polypropylene nonwoven geotextile specifically designed for asphalt overlay applications. Mirafi<sup>®</sup> MPV400 is inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value
Grab Tensile Strength	ASTM D4632	N (lbs)	401 (90)
Grab Tensile Elongation	ASTM D4632	%	50
Grab Tensile Asphalt Saturated	ASTM D4632 modified <sup>1</sup>	N (lbs)	890 (200)
Grab Tensile Elongation Asphalt Saturated	ASTM D4632 modified <sup>1</sup>	%	40 – 70
Asphalt Retention	ASTM D6140	l/m <sup>2</sup> (gal/yd <sup>2</sup> ) (oz/ft <sup>2</sup> )	1.1 (0.25) (3.6)
Change in Area Asphalt Saturated	TX DOT 3099	%	± 15
Melting Point	ASTM D276	°C (°F)	163 (325)
Mass/Unit Area	ASTM D5261	g/m <sup>2</sup> (oz/yd <sup>2</sup> )	119 (3.5)
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70

Physical Properties	Unit	Typical Value		
Roll Width	m (ft)	3.2 (10.5)	3.8 (12.5)	4.4 (14.5)
Roll Length	m (ft)	110 (360)	110 (360)	110 (360)
Roll Area	m <sup>2</sup> (yd <sup>2</sup> )	351 (420)	418 (500)	484 (580)
Estimated Roll Weight	kg (lbs)	48 (106)	57 (126)	66 (146)

<sup>1</sup> Modification to procedure: Sample is saturated with Asphalt.

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**APPENDIX D**

**ASPHALT SPEC SHEET**



<b>TR-448A (6-15)</b>  <b>pennsylvania</b> <small>DEPARTMENT OF TRANSPORTATION</small>	<b>JOB MIX FORMULA REPORT</b>		Supplier Code TDP67A41	Material Class SP9.5
	PennDOT Mix Design Designation		Design ESAL Range	0.3 to < 3 Million
	Year	Number	Aggregate Skid Resistance Level (SRL)	
	2016	H42	H	
	Supplier JMF/Design Number (Optional)		Mixture Final Asphalt Binder Grade	
9536		Asphalt Mix Type		PG6422
		Gradation Classification		HMA
		Original Approval Date		Coarse-Graded
		JMF Status	Approved	

Supplier Name	TDPS Materials	Location	2ND ST N OF ERIE AVE	
ECMS Number	PO No.-Line Item No.		408 Spec	
SR & Section		Plant Type	AD	Plant Size 03
Contractor		Location		

Mix Time	
Dry(s)	Wet(s)

Material Supplier	Material Code - Class	Product Name	% Material	Spec. Grav.	% Absorption
HMC46A14	207 (Aggregate Fine) - B1		13.100	2.642	1.40
HMC46B14	207 (Aggregate Fine) - B3		24.400	2.806	0.66
HMC46B14	203 (Aggregate) - A8		28.600	2.823	0.62
TDP67A41	17 (Hot Rap Design) - RAP		30.000	2.805	0.00
AXON1 15	1 (Asphalt Cement) - PG6422		3.900	1.035	
PBFH0 15	1 (Asphalt Cement) - PG6422			1.030	
SUIT0 15	1 (Asphalt Cement) - PG6422			1.030	

JOB MIX FORMULA AND DESIGN													
A.C. / Sieve Size	A.C%	#200	#100	#50	#30	#16	#8	#4	3/8"	1/2"			
Design Target	5.5	5.0	7	10	16	25	40	63	94	100			
% Virgin A.C.		3.9							1.60		Total % Asphalt (Pb)		5.5
Virgin A.C. PG Binder Grade		PG6422									% Eff. Asphalt Binder (Pbe)		5.1
Calc. Asp. Film Thickness		10.40							0.29		Fines / Asphalt (F/A) Ratio		1.0

MIX CHARACTERISTICS (GYRATORY)							
Design ESAL Range	Mold Diameter (mm)	# Gyrations at Ninitial	# Gyrations at NDesign	# Gyrations at NMaximum	Voids in Mineral Aggregate (VMA) %	Theoretical Max. Sp. Grav. (Gmm)	Bulk Sp. Grav. of Mixture (Gmb)
0.3 to < 3 Million	150	7	75	115	16.1	2.576	2.473
Bulk Sp. Grav. of Combined Aggr.(Gsb)	Mixture Mass to Compact (g)	% Air Voids at Ninitial	% Aid Voids at NDesign	% Air Voids at NMaximum	Voids filled with Asphalt (VFA) %	Theoretical Max. Density (lbs/ft3)	Bulk Density of Mixture (lbs/ft3)
2.787	4,950.0	14.3	4.0	2.6	75.0	160.3	153.9

ASPHALT CONTENT TEST METHOD					
A.C. Test Method	External Party Oven Make/Model	Furnace Temp (°C)	Sample Size for C.F.	Asphalt C.F.	200 C.F.
PTM No. 757	Thermolyne/NCAT Series 1087	538.0	1,300.0	-0.06	0.30

MOISTURE SUSCEPTIBILITY DATA						
A.C. Supplier	Name	Dry PSI Strength	Wet PSI Strength	TSR Value	Date of TSR Test	Date of Boil Test
AXON1 15		103.1	89.8	0.87	2/27/15	
PBFH0 15						2/1/13
SUIT0 15						2/1/13

COMBINED AGGREGATE CONSENSUS PROPERTIES						
AASHTO T 176 Sand Equivalency (%)	AASHTO T 304 Fine Aggr. Angularity Uncompacted Voids (%)	ASTM D5821 - Coarse Aggregate Angularity		ASTM D4791 Flat / Elongated Particles		Total % Reclaimed Agg. From RAP and / or RAS
		% 1 Face Crush	% 2 Face Crush	5:1	3:1 SMA only	
96.0	48.7	100.0	100.0	1.2		95.0

Designed By :	Christopher Boyle	Designed By Certification ID :	2015	Designed Date :	3/16/15
Submitted By :	John Savastio	Submitted By Certification ID :	252	Submitted Date :	7/18/16
Approved By :	David A Borkowski	Approved By Certification ID :	J.BIANCHI	Approved Date :	7/21/16